A New Kind of Structure Variability in GS_3-Nil Vegetable Fats from Specific Biological Sources. The Glyceride Structures of Two *Vateria indica* Seed Fats

THE POSSIBLE PREDICTION or computation of glyceride structures from component acid compositions has been one of the major objectives of all investigations on glyceride structure of natural fats (Hilditch and Meara, J. Soc. Chem. Ind. *61,* 117, 1942). The emergence of data which indicate that this objective is probably unattainable even in the case of different specimens of fat from the same biological source will hence be of some interest.

The variability of degree of high order compositeness (HOC index) (Kartha and Narayanan, Ind. J. Chem. *5,* 543, 1966; Kartha and Narayanan, JAOCS, in press) in fats from different biological species made structure predictions untenable for fats from any new species. This has been followed by the observation (Kartha, Ind. J. Chem., in press) that fats from different varieties of the same species can show variability of HOC indices. For example, seed fat from the brown variety of *Sesamum indicum,* with Sm-16.0 (Sm—saturated acids present, molecules percentage), showed HOC index of GS_3-nil, GS_2U-1 (Kartha, Ind. J. Chem., in press; Kartha, JAOCS *30,* 280, 326, 1953) whereas that from the white variety, with Sm-14.0, showed HOC index GS_3-nil, $GS_2U + 3.4$ (Kartha, Ind. J. Chem., in press).

The study of glyceride structures of different specimens of fat from the same biological variety which were collected from different geographical areas has now demonstrated that subvarietal mutations which produce little or no morphological change can sometimes produce variability in HOC indices. This possibility has made it impractical to make structure predictions even in the case of different specimens of fat from the same biological source. Variability of HOC indices in fats from the same biological variety has so far been observed in three varieties in the author's laboratory and is now illustrated with reference to two specimens of the well known *Vateria indica* seed fat, which contain remarkably little nonfatty impurities and hence present no difficult analytical problems for repetition of the work.

The experimental accuracy attainable in determining HOC indices is important in this connection. This is of the same order ($\pm 0.75\%$ of GS_2U) as obtainable in the determination of GS_2U in C_{16}–C_{18} acid fats by the azelaoglyceride analysis technique (Kartha, JAOCS *30,* 280, 326, 1953). The fact that the absence of HOC variability in different fats from the same biological source can be readily established by the technique which is available at present is illustrated by the structure of three *Myristica malabarica* mace fats (Kartha and Narayanan, JAOCS, submitted for publication): in these the Sm showed variations from 36.5 to 49.8, but the HOC indices varied from GS_3-nil, $GS_2U + 1.8$ to GS_3-nil, $GS_2U + 2.6$ only. Variations in HOC indices can hence be definitely established to an accuracy of $\pm 0.5\%$.

The *V. indica* seed fat earlier examined (Kartha, JAOCS *30,* 280, 326, 1953) formed the first specimen. The GS_3 content of this specimen was redetermined by using more sensitive techniques, namely, crystallization from acetone-methyl alcohol at 25C under specified conditions (Kartha, J. Sci. Ind. Res. *12A,* 504, 1953) and calculation from the difference in melting points between the fat and its total saturated acids (Kartha, J. Sci. Ind. Res. *11A,* 354, 1952). Its structure has been recalculated on the basis of the correct GS_3 content, which was only 0.2%. This specimen with SM-57.1 had final structure GS_3-traces, GS_2U-76.3, GSU_2-18.7, and GU_3-5.0% mol. against traces, 74.1, 23.1, and 2.8% mol. respectively required by the Glyceride Type Distribution Rule (Kartha, JAOCS *30,* 280, 326, 1953). The HOC index (Kartha and Narayanan, JAOCS, in press) was GS_3-nil, $GS_2U + 2.2$. The second specimen was a laboratory-extracted fat and had iodine value 36.5, unsaponifiables 1.0%, insoluble acids 95.0%, and Sm-59.3. The structure, determined by the same technique as before (Kartha, JAOCS *30,* 280, 326, 1953), was GS_3-traces, GS_2U-84.5, GSU_2-8.7, and GU_3-6.8% mol. against traces, 79.3, 19.3, and 1.3% mol. respectively as required by the Glyceride Type Distribution Rule. The second specimen thus had an HOC index of GS_3-nil, $GS_2U + 5.4$.

There is a difference of +3.2 units percentage of GS_2U in the HOC indices of the two specimens of *V. indica* seed fat, and similar variations can take place with other fats also. Prediction of glyceride structure on the basis of constancy of the HOC indices for fats from the same biological variety is hence no longer justifiable though this would have been feasible if fats from the same biological varieties had always showed the constancy of HOC indices as indicated by the series of *M. malabarica* mace fats (Kartha and Narayanan, JAOCS, submitted for publication). Full details of analyses along with other examples will be communicated separately.

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